MULTIMEDIA UNIVERSITY

STUDENT ID NO

TABLE NO:

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2021/2022

PMT0201 – MATHEMATICS II

(All sections / Groups)

5 OCTOBER 2022
9.00 a.m. – 11.00 a.m.
(2 Hours)

Question	Marks
1	
2	
3	
4	
Total	

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 11 **pages** only including the cover page with **4 Questions.**

2. Attempt **ALL FOUR** questions. The distribution of the marks for each question is given.

3. Write your answers on the question paper provided.

4. Show proper steps.

Question 1 (10 Marks)

(a) Let $P\left(x, \frac{3}{5}\right)$ be a point in Quadrant II on a unit circle centered at the origin.

(i) Find the value of x in P.

(ii) Find sec(t) and tan(t) if t is the distance along the unit circle revolved in a counterclockwise direction starting from the point (1, 0) and ending at the point P. **[3 marks]**

(b) Given θ is an angle in Quadrant III and $\cos\theta = -\frac{2}{3}$. **[2.5 marks]**

(i) Express $\sin\theta$ in terms of $\cos\theta$.

(ii) From (i), find the exact value of $\sin\theta$.

Continued...

(c) Given that $y = 2\cos\left(2x + \frac{\pi}{2}\right) + 2$. **[4.5 marks]**

(i) Find the amplitude, period, phase shift and vertical shift of the given y.

(ii) Sketch one complete period of $y = 2\cos\left(2x + \frac{\pi}{2}\right) + 2$ starting from $x = \frac{-\pi}{4}$ state clearly all the x and y intercepts.

Continued...

Question 2 (15 Marks)

(a) Without calculator, find the exact value of $\cos\left(\sin^{-1}\left(-\frac{3}{4}\right)\right)$ **[2 marks]**

(b) (i) Show that $\frac{1-\cos 2x}{\tan x} = \sin 2x$

(ii) From (i) solve $\frac{1-\cos 2x}{\tan x} = \frac{-\sqrt{3}}{2}$. **[4 marks]**

Continued...

(c) A triangle ABC has a=15, b=18, and $\angle C = 40°$. **[5 marks]**

(i) Based on the given information, sketch the triangle ABC.

(ii) Solve the triangle ABC. Round your answers to **four** decimal places.

(iii) Find the area of the triangle ABC. Round your **final answer** to **two** decimal places.

Continued...

(d) Given that complex number $z = -\sqrt{3} + i$. **[4 marks]**

(i) Graph z on the complex plane.

(ii) Then find the polar form of z.

(iii) Use **De Moivre's Theorem** to find z^5. Leave the answer in the form of $z^5 = a + bi$ where $a, b \in \Re$.

Continued...

Question 3 (15 Marks)

(a) Compute the limits. Show at least two intermediate steps. **[2.5 marks]**

(i) $\lim_{x\to 3} \dfrac{x^2-9}{2x^2-5x-3}$ (ii) $\lim_{x\to \infty} \dfrac{3x^2-2}{x^2+2x+1}$

(b) Suppose $f(x)=\begin{cases}3+\cos(\pi x), & \text{if } x<4\\ \sqrt{3x+4}, & \text{if } x\geq 4\end{cases}$

Determine whether f is continuous at 4. Show proper steps. **[2.5 marks]**

Continued...

(c) Let $g(x)=\sqrt{2x-1}$.

Use the **formal definition** of derivative to find $g'(4)$. **[3 marks]**

(d) Find the derivatives of $p(x)$ and $q(x)$. Show proper steps.

(i) $p(x)=x\ln(2x)$ (ii) $q(x)=\dfrac{\cos(x)}{3\sin(x)+1}$ **[3 marks]**

Continued...

(e) Let $h(x) = x^3 - 9x^2, \quad -1 \leq x \leq 3$ **[4 marks]**

(i) Find the critical number(s) and end points for the given domain.

(ii) From (i), determine the absolute maximum and minimum values of the function h.

Continued...

Question 4 (10 Marks)

(a) Compute the integral $\int_1^2 \frac{4x+1}{\sqrt{2x^2+x}}dx$. **[3 marks]**

(b) Use **integration by parts** to find $\int \ln(5x)dx$. **[3 marks]**

Continued...

(c) Given the curves $y = 3x - x^2$ and $y = 2x - 6$. **[4 marks]**

(i) On the same axes sketch the graphs and find the points of intersections between the curves.

(ii) Find the area of region enclosed by the two curves.

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